REMARKS

By the above amendment, Claims 1 and 8-11 are amended, Claims 7 and 17-30 are cancelled, and Claims 31-38 are added. Accordingly, Claims 1-6, 8-16 and 31-38 are pending.

On page 2 of the Office Action, **Claims 1-6** and **15** are rejected as being anticipated by U.S. Patent Application No. 2002/0198071 to Snow ("Snow"). Accordingly, Claim 1 has been amended to include the limitations from Claim 7, and Claim 7 has been cancelled.

On page 3 of the Office Action, **Claims 7-12** are rejected as being obvious over Snow in view of U.S. Patent No. 6,776,735 to Bélanger et al. ("Bélanger"). In the Examiner's view, Bélanger discloses that it is known to vary fiber angles depending on the area of the bat to control flexibility, tensile, or hoop strength in a particular portion. Since Claim 1, as amended, includes the features of original Claim 7, the Examiner's rejection of Claims 7-12 now applies to amended Claim 1. Antecedent basis for this amendment is found on pages 15-20 of the application.

Claim 1, as amended, is directed to a baseball bat having a handle portion, a cylindrical tubular hollow void barrel portion, and a tapered mid-section portion. The handle, barrel and mid-section portions are constructed solely of a polymer composite material comprising a thermoset resin and continuous length reinforcement fibers, the fibers comprising multiple intertwined tubular braid forms being arranged in multiple layers. The fibers in the handle portion are arranged at a resultant fiber angle relative to the central longitudinal axis of the bat that is less than the resultant fiber angles of the fibers in the barrel portion, thereby providing the handle portion with an axial stiffness that is greater than the axial stiffness of the barrel portion. As thus claimed, the bat described by the applicant herein patentably distinguishes over the combination of references cited by the Examiner.

In particular, Snow claims a multi-layered (24, 26) all polymer composite bat having a central cavity (13) extending the length of the bat. Bélanger discloses a bat having a wood or foam core (15) coated with a first resin (17), wound with fibers (18) and coated with a second resin (19) [see Figure 2A and column 4, lines 35-40]. Bélanger states that various winding patterns for the continuous fibers can be used, as shown in Figures 3 and 4. Figure 3, shows fibers wound at an angle of 0 degrees relative to a first plane normal to the longitudinal axis of core (15). Figure 4 shows a winding pattern of 45 degrees.

Bélanger also states that different portions of the bat can be wound with different angles and different fibers (see column 4, lines 47-54). However, Bélanger makes no statement as to the purpose for varying the fiber angles (~~of his bat~~) or what effect such variation may have on bat properties such as axial stiffness, transverse stiffness, bending mode frequency or hoop frequency, or the effect on bat performance. More importantly, Bélanger makes no statement as to how such properties should be varied in the handle portion relative to the barrel portion of the bat.

The Examiner is requested to note that Bélanger measures fiber angles relative to a first plane normal (perpendicular) to the longitudinal axis "A" [see Figure 2]. In contrast, the applicant in the present application, measures fiber angles relative to the longitudinal axis (30). As a result, a Bélanger fiber angle of 0 degrees is the same as applicant's fiber angle of 90 degrees and vice versa. For example, Figure 3 of Bélanger shows a fiber angle of 0 degrees relative a first plane normal to the longitudinal axis . According to the applicant's method of measuring fiber angles directly relative to the longitudinal axis, Figure 3 of Bélanger shows a fiber angle of 90 degrees.

Bélanger describes two main embodiments. The **first**, (reflected in Claim 1), at column 4, line 64 to column 5, line 5, describes a bat wherein the fiber angles vary as follows:

Bélanger:	Barrel	0-90
	Handle	35-55

In the applicant's measuring system, this corresponds to the following:

Applicant:	Barrel	90-0
	Handle	55-35

Bélanger makes no statement that the fiber angles in the handle should be greater or less than the fiber angles in the Barrel. Only that they should fall within the ranges specified. In fact, in this first embodiment, the fiber angles in the handle could be either greater than or less than the fiber angles in the barrel, regardless of which angle measuring system is used.

The **second** embodiment of Bélanger (Col. 5, lines 6-35, and Claims 12 and 29) describes a bat wherein the fiber angles vary as follows:

Bélanger:	Barrel	35-55
	Transition	25-55
	Throat	15-35
	Handle	5-25
	Knob	35-55

In the applicant's measuring system, this corresponds to the following fiber angles:

Applicant:	Barrel	55-35
	Transition	65-35
	Throat	75-55
	Handle	85-65
	Knob	55-35

In this second embodiment, when measured using the applicant's angle measuring system, the fiber angles in the handle are greater than, not less than, the fiber angles in the barrel. In claim 23, Bélanger also describes the following fiber angle configuration:

Bélanger:	Barrel	90
	Handle	35-55

In the applicant's measuring system, this corresponds to the following:

Applicant:	Barrel	0
	Handle	55-35

Again, the fiber angles in the handle are greater than in the barrel.

It is interesting to note that Bélanger never discloses the reason for varying the fiber angles between various segments of the bat, except to note that the bats (~~of his invention~~) are durable (see examples in columns 8 and 9). The purposes stated by Bélanger for the invention are to make a bat that mimics the appearance, performance and sound of a conventional wood bat, replicates the effort required to swing a wood bat, and is more durable than an all-wood bat.

All of Bélanger's bats have a solid core of wood or foam running throughout the bat, whereas, the bat claimed by the applicant has at least a hollow, void barrel portion and is made solely of a polymer composite material.

Bélanger discusses varying fiber angles of continuous fibers wound around the bat core using a conventional circumferential winding machine. The applicant, on the other hand, uses two-dimensional intertwined tubular braid forms. The only mention by Bélanger of braided,

two-dimensional fiber forms is for the reinforcing sheath (36), which is applied to the core, having fibers oriented at either 0 or 90 degrees.

The applicant admits, as the Examiner has suggested, that it is known in the art that mechanical properties such as axial and radial stiffness, can be adjusted by varying fiber angles. However, what is not previously known in the art is that to improve bat performance, it is desirable to construct a bat that has greater axial stiffness in the handle portion relative to the barrel portion. This is achieved in the applicant's bat, as described in claim 1, by arranging the fiber angles such that the average of the absolute values of all the resultant fiber angles in the handle portion are less than the average of the absolute values of all the resultant fiber angles in the barrel portion.

It is also NOT known in the art that bending mode frequency and hoop frequency can be varied by varying the fiber angles.

Certainly, neither Snow nor Bélanger teach that it is advantageous, in an all polymer composite bat, to have a handle portion that has greater axial stiffness than the barrel portion. In fact, Bélanger teaches away from this concept. In Bélanger's second embodiment (Claims 12 and 29) and in the bat described in claim 23, the fiber angles in the handle portion are in fact greater than the fiber angles in the barrel portion, when measured using the applicant's angle measuring system. This results in a bat that has less axial stiffness in the handle than in the barrel. Completely opposite to that claimed by the applicant herein.

Indeed, in the first embodiment described by Bélanger (Claim 1), many of the bat configurations that fall within the ranges of fiber angles specified would result in a handle that is less axially stiff than the barrel. The fact that the fiber angles ranges specified by Bélanger fall outside the ranges which the applicant has found to provide for greater axial stiffness in the handle relative to the barrel, thereby giving the bat improved performance properties, is conclusive that Bélanger never contemplated, and certainly does not teach, that it is advantageous to construct a bat having greater axial stiffness in the handle than in the barrel, as described by the applicant in Claim 1, as amended.

Accordingly, there is no teaching or even suggestion in Bélanger that a person skilled in the art can increase bat performance by reducing the fiber angles in the handle of an all composite bat, relative to the barrel, to thereby increase axial stiffness in the handle relative to the barrel and increase radial or transverse stiffness of the barrel relative to the handle. In fact, as

demonstrated above, Bélanger teaches in the exact opposite direction.

This point is further emphasized by some of today's leading bat manufactures, who are presently producing bats wherein the axial stiffness of the handle is reduced relative to the barrel. For example, attached is a page from the Worthsports.com web site, located at http://www.worthsports.com/whiplash/whiplash_tech.swf. Worth's Hyperflex tension process is designed to produce a bat with thinner walls in the handle and taper sections of the bat, thus lowering the axial stiffness of these regions relative to the bat barrel. This is opposite to the applicant's claimed bat, wherein the fiber angles in the handle are less than in the barrel, thus providing the handle with greater axial stiffness than the barrel.

Similarly, Easton Sports describes its new BST3 Stealth CNT as providing maximum handle flex (see attached page from http://baseball.eastonsports.com/adultbaseball/details.php?scid=1&d=bst3&t=Bat).

Easton also describes its SCN3 Synergy CNT Flex as being "designed for more handle flex (see attached page from http://baseball.eastonsports.com/slowpitch/details.php?scid=22&d=scn3&t=Bat).

Accordingly, the applicant's all composite bat, as now described in amended claim 1, provides a structure that is contrary to the teaching provided by the combination of Snow and Bélanger cited by the Examiner, and is indeed contrary to the teaching of leading bat manufactures in the industry. Accordingly, claim 1, and the claims that depend therefrom are submitted to patentably distinguish over the prior art and the Examiner is requested to allow these claims.

New independent Claims 31 and 35 have been added to describe further commercial embodiments of the applicant's bat. Both claims are similar to Claim 1, as amended, in that they describe a bat wherein the fibers in the handle portion are arranged at a resultant fiber angle relative to the central longitudinal axis of the bat that is less than the resultant fiber angles of the fibers in the barrel portion, thereby providing the handle portion with an axial stiffness that is

greater than the axial stiffness of the barrel portion. As such, both independent Claims 31 and 35, and the claims that depend therefrom, are submitted to distinguish over the prior art cited by the Examiner.

Respectfully submitted,

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